

## **DIVISION 7 - THERMAL/MOISTURE PROTECTION**

### **SECTION 07110 - ELASTOMERIC SHEET MEMBRANE WATERPROOFING**

#### **PART 1 - GENERAL**

##### **1.01 - DESCRIPTION**

- A. For other requirements see General Conditions, Supplementary General Conditions and General Requirements (Division 1).
- B. SCOPE OF WORK
  - 1. Removal of existing protrusions or any irregularity that could damage the waterproofing membrane.
  - 2. Wall preparation per manufacturer's requirements.
  - 3. Waterproofing membrane system.
  - 4. Protection system.
  - 5. Other accessory work specified or required to complete the work.

##### **1.02 - QUALITY CONTROL**

- A. CONTRACTOR QUALIFICATIONS

Contractor shall be licensed by manufacturer as applicator of waterproofing system. He shall be licensed in this system for not less than 5 years. (Submit copy of certified applicator with the bid submission.).
- B. MANUFACTURER QUALIFICATIONS
  - 1. Products to be in the waterproofing market for not less than 8 years.
  - 2. Submit sample of guarantee by manufacturer.
- C. WEATHER LIMITATIONS

Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with these specifications.

When the local official weather bureau forecasts a probability of over 20% chances of rain or snow for the day, no waterproofing work shall be performed. Work only when temperature is 25°F or more and rising.

##### **1.03 - REFERENCE STANDARDS**

- A. American Society for Testing of Materials (ASTM) as specified herein.

##### **REFERENCES:**

D297-81	Methods for Rubber Products - Chemical Analysis
D412-87	Test Methods for Rubber Properties in Tension
D471-79	Test Method for Rubber Property - Effect of Liquids
D573-88	Test Method for Rubber - Deterioration in an Air Oven
D624-86	Test Method for Rubber Property - Tear Resistance
D746-79(1987)	Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
D816-82(1988)	Methods of Testing Rubber Cements
D1149-86	Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens)
D2240	Test Method for Rubber Properties in Tension
E96-80	Test Methods for Water Vapor Transmission of Materials
D3083	Specifications for Flexible Plastic Sheeting for Pond, Canal, and Reservoir Lining
E154	Method of Testing Materials for Use as Vapor Barriers Under Concrete

#### **1.04 - BUILDING CODES AND INSPECTIONS**

- A. All work to comply with Ohio Building Code (O.B.C.).

#### **1.05 - COORDINATION**

- A. Contractor to coordinate the work with the local weather forecast and the Owner's Representative EVERY MORNING before commencing the work.
- B. Contractor to coordinate the work with:
  - 1. General Contractor.
  - 2. Concrete Contractor.
  - 3. Mechanical and Electrical Contractors.

#### **1.06 - TESTING**

- A. Contractor to perform test cuts if required by the Owner's Representative for verification of the work. Contractor to pay for the cost of testing and patching of the waterproofing system as required.

#### **1.07 - JOB CONDITIONS**

- A. EXAMINATION OF SUBSTRATE  
Installer must examine substrate and conditions under which the work is to be performed. Do not proceed with the work until substrate is smooth and sound.
- B. Do not proceed with the work until following requirements are fulfilled:
  - 1. All foundation walls are free of mud, dry and smooth enough for membrane application.
  - 2. All penetrations by ALL Mechanical and Electrical Contractors are installed properly (as applicable).
- C. Failure to comply with above requirements will make this Contractor financially responsible for this work if not acceptable.

#### **1.08 - PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in original unopened containers.
- B. Containers shall be labeled with manufacturer's name, brand name, installation instructions, and identification of various items.
- C. Store materials between 60°F and 80°F. If exposed to lower temperature, restore to 60°F minimum temperature before using.
- D. Store materials in dry area and protect from water and direct sunlight. Damaged materials shall be replaced at Contractor's expense.

#### **1.09 - SUBMITTALS**

- A. Submit shop drawings of sheet layouts, splices and details for approval before proceeding with work.
- B. Submit sample of all materials to be used.
- C. Submit specifications and manufacturer's literature of all miscellaneous products to be used in conjunction with the waterproofing system.
- D. Submit others as required in Article 1.02 or miscellaneous articles in this specification.

## PART 2 - PRODUCTS

### 2.01 - MATERIALS

- A. Obtain primary waterproofing materials from one manufacturer to greatest extent possible. Provide secondary materials (and material not available from primary waterproofing materials manufacturer) which are recommended by manufacturer of primary materials.
- B. PROTECTION FROM DETERIORATION  
Comply with manufacturer's recommendations for handling, storage and protection during installation.
- C. WATERPROOFING MEMBRANE  
To be .060" thick, 10' x 150' or the largest sheet possible as determined by job conditions, Butyl (isobutylene and isoprene) compound elastomer conforming to the following minimum physical properties:

Property	Test Method	Specification	Typical Properties
Color		Grey/Black	
Thickness Tolerance, %	ASTM D 412	± 10	
Specific Gravity	ASTM D 297	1.20 ± .05	1.18
Tensile Strength min., psi (MPa)	ASTM D 412	1200 (8.3)	1500 (10.3)
Elongation, ultimate min., %	ASTM D 412	300	400
Hardness, Durometer A	ASTM D 2240	60 ± 10	55
Tear Resistance min., lbf/in (kN/m)	ASTM D 624 (Die C)	125 (21.9)	185 (32.4)
Brittleness Temperature max., °F (°C)	ASTM D 746	-40 (-40)	-45 (-43)
Water Vapo Permeability max. perms	ASTM E 96 (Proc. B or BW)	0.0025 perms	
Resistance to Water Absorption Change in mass max., after 7 d immersion @ 158°F	ASTM D 471	+ 2	1.0
Puncture Resistance (lbs.) (stretched by blunt object)	ASTM E 154	95	120
Resistance to Soil Burial (% change in max. in original value)	ASTM D 3083 (modified)**		
1. Breaking Factor		10	
2. Elongation at Break		20	
Factory Seam Strength min., lbf/in., (kN/m)	ASTM D 816 (Method B)	Membrane Rupture	

Property	Test Method	Specification	Typical Properties
Resistance to Heat Aging Properties after 168 hrs. @ 240°F	ASTM D 573		
Tensile strength min., psi (MPa)		840 (5.8)	1200 (8.3)
Elongation, ultimate min., %		210	295
Linear dimensional change, max., mass %		± 2	
Ozone Resistance Condition after exposure to 55 pphm ozone in air for 100 hrs. @ 104°F (sample under 20% strain)	ASTM D 1149	No cracks	No cracks

- D. FLASHING: Sure-Seal® Elastoform Flashing®: .060" thick, furnished by membrane manufacturer.
- E. BONDING ADHESIVE: A high-strength synthetic rubber adhesive used to bond membrane to compatible substrate, furnished by membrane manufacturer. DO NOT USE FOR SPLICES.
- F. SPLICE CLEANER: Cleans membrane surfaces before applying cement and lap sealant, furnished by membrane manufacturer.
- G. POURABLE SEALER: A two-component polyurethane based material used with Lay Flat Tubing and to seal around difficult objects, furnished by membrane manufacturer.
- H. LAY FLAT TUBING: Pourable Sealer is applied along the bottom edge of the butyl membrane and is compressed by Lay Flat Tubing to provide a temporary seal of completed waterproofing sections. Furnished by membrane manufacturer.
- I. RUBBER GLOVES: for application of Splice Cleaner and other adhesives, furnished by membrane manufacturer.
- J. INSULATION: Furnished by membrane manufacturer or other manufacturer, if required.
- K. HP PROTECTION MAT: A geotextile mat used for protecting the membrane splice on compacted sand surfaces, furnished by membrane manufacturer.
- L. BUTYL GUM TAPE: .030" thick, furnished by membrane manufacturer for American Railway Engineering Association splice system.
- M. PROTECTION COURSE: Shall be CCW Protection Board-H for horizontal surfaces or CCW Protection Board-V for

vertical surfaces.

- N. DRAINAGE PROTECTION BOARD COMPOSITE: Shall be a CCW Sure-Drain™ as recommended by the manufacturer for each condition.

## **2.02 - ACCEPTABLE MANUFACTURERS**

### **A. BASIS OF DESIGN:**

1. Sure-Seal® Butyl Membrane Water Proofing Systems as manufactured by:

Carlisle Coatings and Water Proofing Inc.  
P.O. Box 1600  
Sepulpa, OK 74067-1600  
Phone: (800) 338-8701, Fax: (918) 227-0603

### **B. OTHER ACCEPTABLE MANUFACTURER'S:**

1. Grace.
2. Firestone.

## **PART 3 - EXECUTION**

### **3.01 - WATERPROOFING MEMBRANE INSTALLATION**

#### **A. GENERAL**

1. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the waterproofing system. Any exposures not typical for normal installations must be presented to manufacturer for assessment of any impact on the waterproofing system performance. Do not expose membrane to a constant temperature in excess of 180°F.
2. Care shall be exercised to prevent damage to waterproofing and other adjacent materials. Substrate shall be cleaned to permit sound, smooth application of new waterproofing membrane.
3. All waste shall be promptly removed from site and properly disposed of.
4. Protect temporarily the waterproofing membrane until covered by protective board and backfilling.
5. Surfaces being waterproofed shall be maintained dry during all work.
6. Coordinate installation of waterproofing materials and associated work to provide a complete system complying with combined recommendations of manufacturer.
7. Cooperate with inspection and testing agencies performing services in connection with work.

8. Protect other work from spillage and prevent materials from entering and clogging drains, conductors and storm system.
9. Install waterproofing membrane in such sequence that will minimize movement of workers and equipment over completed areas. Protection board shall be installed just after membrane installation.
10. Before starting any work, protect in an approved manner, all paving and face of building walls adjacent to work areas. Protection shall remain in place for duration of the work.
11. Work shall not begin until mechanical accessories are in place and approved by the Owner's Representative.
12. Follow cold temperatures restrictions for the installation of this waterproofing system. Follow specified precautions for storage of materials and expose only enough adhesive to be used within a 4 hour period.
13. Before any waterproofing work is started, the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies. Should any deficiencies exist, the Architect, Owner or General Contractor shall be notified in writing and corrections made.
14. Concrete shall be cured at least 7 days or pass ASTM D 4263.
15. Earth: Remove all vegetation, rocks larger than 3/4", etc. Substrate shall be raked smooth, filling in depressions. Apply a 3" minimum sand bed compacted to 95% Modified Proctor in accordance with ASTM D 698 earth substrate.

B. WATERPROOFING SUBSTRATE CRITERIA

1. The concrete surface must be free from laitance, loose aggregate, sharp projections, grease, oil, dirt, curing compounds or other contaminants.
2. Provide a smooth, even substrate. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
3. Repair joints and cracks wider than 1/4" Sure-Seal Pourable Sealer.

C. MEMBRANE INSTALLATION

1. Horizontal Attachment:
  - a. Recommended installation is to completely

adhere membrane to the substrate.

- 1) Position .060" membrane over approved substrate without stretching.
- 2) Allow membrane to relax approximately 1/2 hour prior to bonding.
- 3) Fold back half the sheet. Fold sheet without wrinkles or buckles.
- 4) Apply Bonding Adhesive evenly, without globs or puddles, with a 9" plastic core medium nap paint roller, to the sheet and substrate at a coverage rate of 60 sq. ft. per gallon. DO NOT APPLY BONDING ADHESIVE TO THE SPLICE AREA.
- 5) Allow adhesive to dry until it is tacky, but will not string or stick to a dry finger touch.
- 6) Roll the coated membrane into the coated substrate while avoiding wrinkles.
- 7) Brush down bonded half of the sheet with a brush to achieve maximum contact.
- 8) Fold back the unbonded half of the sheet and repeat the bonding procedure.
- 9) Install adjoining sheets in the same manner, lapping edges a minimum of 6". Stagger end laps a minimum of 12".

## 2. Vertical Attachment.

- a. Recommended installation is to completely adhere the membrane to the substrate.

- 1) Unroll membrane and allow to relax approximately 1/2 hour prior to bonding.
- 2) Apply Bonding Adhesive evenly, without globs or puddles, with a 9" plastic core medium nap paint roller, to the sheet and substrate at a coverage rate of 60 sq. ft. per gallon. DO NOT APPLY BONDING ADHESIVE TO THE SPLICE AREA.
- 3) Allow adhesive to dry until it is tacky, but will not string or stick to a dry finger touch.
- 4) Roll the coated membrane into the coated substrate while avoiding wrinkles.
- 5) Brush down bonded sheet with a brush to achieve maximum contact.
- 6) Install adjoining sheets in the same manner, lapping edges a minimum of 6". Stagger end laps a minimum of 12".

#### D. MEMBRANE SPLICING

1. Mark the edge of overlapping sheet with Splice Cleaner and fold top sheet back 12" for cleaning and EP-95 application.
2. Remove dirt, foreign material and excess dust from splice area by brooming or wiping with a Carlisle Sure Seal HP Splice Wipe. If necessary, scrub the sheet with warm soapy water and rinse with clean water.
3. Thoroughly clean splice area with Splice Cleaner to achieve a solid black color.
4. Apply EP-95 Splicing Cement at the rate specified on the container label to both surfaces using a 3" wide 1/2" medium nap roller or a 3 or 4" x 1/2" thick paint brush. The cement area should be 1" wider than the 6-1/4" wide Butyl Gum Tape (BGT). Do not allow to glob or puddle. Allow cement to dry until it is tacky but will not string or stick to a dry finger touch and will not move when pushed with a dry finger.
5. Apply BGT to extend a minimum of 1/8" to a maximum of 1/2" past edge of top sheet. Roll or press tape parallel to its length to prevent trapped air.
6. Remove polyethylene backing from the tape and allow top sheet to fall freely into place without stretching or wrinkling sheet.
7. Roll the top membrane toward the bottom membrane and firmly mate together by applying firm hand pressure perpendicular to the length of splice.
8. Roll splice with a 2" wide steel roller, using positive pressure, toward outer edge of splice.
9. Wait a minimum of 2 hours before applying Lap Sealant.
10. Clean splice edge, extending 1" onto top and bottom membranes with Splice Cleaner.
11. Apply 1/4" bead of Lap Sealant completely covering the splice edge. Feather with feathering tool. Complete Lap Sealant application to splices each day.

#### E. PERIMETER MEMBRANE SECUREMENT

Securement shall be provided at the perimeter of each waterproofing membrane section, expansion joint, etc.

Securement shall be as follows:

Membrane shall be mechanically fastened around perimeter and penetrations, as shown on standard details and drawings.

Non-ferrous termination bar strips shall be mechanically fastened into the appropriate structural substrate, as

shown on details. The mechanical fastener must be accepted by Carlisle or membrane manufacturer for use on each specific project PRIOR to installation.

The mechanical fasteners shall be set flush with the top surface of the termination bars. Space mechanical fasteners a maximum of 12" on center starting 1" from each end of the termination bar.

After mechanically fastening the termination bar it shall be lap sealed according to the appropriate detail.

F. PENETRATIONS

1. GENERAL

Flash all penetrations (pipes, round supports etc.) passing through the membrane.

The flashing seal must be made directly to the penetration passing through the membrane system.

2. PIPES, ROUND SUPPORTS, ETC.

Flash pipes with factory made Molded Pipe Flashings where installation is possible.

Molded pipe flashing cannot be cut and patched; flanges cannot be overlapped.

Where Molded Pipe Flashings cannot be installed, use field fabricated pipe seals.

G. SURFACE SPLICE

Correction of splices, tears, etc., may be accomplished by splicing a membrane section over the affected area.

Select repair membrane which is the same material as that to be repaired.

Extend the repair membrane section at least 6" in every direction from the splice, tear, etc., to be corrected.

To remove field dirt, clean the splice area with soap and water, rinse with clean water, and dry, following 'splice wash' application.

H. Provide 0.125 minimum protection board as soon as membrane installation and inspection/approval by the Owner's Representative and the manufacturer. Install drain pipe and backfill immediately without damaging the membrane.

I. DAILY SEAL

1. Temporarily seal loose edge of membrane with Sure-Seal Pourable Sealer.

2. Apply Pourable Sealer at a rate of 100 lineal feet per gallon. Use a trowel to spread material to achieve complete seal 12" back from sheet edge onto exposed substrate.
3. Embed membrane in Pourable Sealer, checking for continuous contact.
4. Provide continuous pressure over cut off with Sure-Seal Lay Flat Tubing.
5. Resume work by pulling sheet free.

J. PROTECTION COURSE

1. Install Sure-Drain-V Drainage Composite within 24 hours on vertical surfaces.
2. Install Sure-Drain-H Drainage Composite immediately after flood testing on horizontal surfaces. If flood testing is delayed, install a temporary covering to protect the membrane from damage by other trades.

**3.02 - WATERPROOFING MEMBRANE PERFORMANCE**

- A. Membrane and associated work shall be watertight and not deteriorate at rates more rapid than indicated by manufacturer. Any failure of work to comply with these requirements will be considered a failure of materials and workmanship under the guarantee.
- B. The whole system of waterproofing and associated work shall, under normal conditions and with normal maintenance, perform without failure.

**3.03 - MANUFACTURER'S FINAL INSPECTION**

- A. The Contractor shall arrange the final inspection of the work with manufacturer's technical representative and the Owner's Representative, and schedule it in not less than 3 working days notice. The Owner's Representative SHALL be present unless this requirement is waived.

**3.04 - CLEAN-UP**

- A. Contractor to remove leftover materials, tools and equipment from property at completion of the work.
- B. Contractor to clean all spillage of waterproofing materials from adjacent surfaces to the satisfaction of the Owner's Representative.

### 3.05 - WARRANTIES

- A. A 5 year warranty shall be issued for the installation.
- B. Warranty to start after FINAL acceptance of the WHOLE project by the Owner and after approval of waterproofing system by manufacturer, provided that the work is substantially complete and placed in service.

END